

WHAT IS CLAIMED IS:

1. A combination glass pH electrode, the standard potential of which is stabilized by means one or more of the following structural modifications:

(a) incorporation of a noble metal internal element in the pH half-cell, said noble metal by reason of its inertness maintaining its purity of composition and not degrading the purity of composition of solutions in contact with it;

(b) incorporation of a noble metal internal element in the reference half-cell as in the pH half-cell, said noble metal by reason of its inertness maintaining its purity of composition and not degrading the purity of composition of solutions in contact with it;

(c) incorporation of an internal pH bulb electrolyte with stable pH and oxidation-reduction potential, said electrolyte by reason of its stable pH maintaining a stable interfacial potential at a pH-sensitive glass surface and by reason of its stable oxidation-reduction potential maintaining a stable electrochemical potential in contact with a noble metal;

(d) incorporation of an homogenous reference electrolyte with stable oxidation-reduction potential and equitransferent salt, said electrolyte by reason of its stable oxidation-reduction potential maintaining a stable electrochemical potential in contact with a noble metal and by means of its equitransference maintaining a low and stable junction potential in contact with an electrolyte of differing composition;

(e) incorporation of a liquid junction composed of a porous, inert material;

(f) incorporation of a reference electrolyte compartment vent that minimizes moisture loss or pick-up from the surroundings yet admits sufficient

air to permit flow of reference electrolyte through the liquid junction under the influence of gravity;

(g) incorporation of a storage sleeve into which the glass bulb, liquid junction, and vent portions of the electrode can be sealed such that moisture loss is eliminated during storage; and/or

(h) incorporation of an absorbent medium located in the storage sleeve and in contact with the glass pH bulb such that said absorbent medium, when intentionally moistened with water or when becoming moistened due to reference electrolyte leaking from the electrode's liquid junction, serves to maintain high humidity in the interior of the storage sleeve and further serves to maintain the pH bulb in a hydrated state.

2. An electrode as in Claim 1, where the noble metal in the pH half-cell comprises platinum.

3. An electrode as in Claim 1, where the noble metal in the reference half-cell comprises platinum.

4. An electrode as in Claim 1, where the electrolyte in the pH half-cell comprises phosphate or borate buffer to stabilize the pH and a mixture of iodide and triiodide to stabilize the oxidation-reduction potential.

5. An electrode as in Claim 4, where the electrolyte in the pH half-cell has a pH slightly different from 7.00 in order to generate a potential across the pH bulb that cancels the potential across the liquid junction when the electrode is in pH 7.00 buffer so that the overall potential of the electrode is nearly zero.

6. An electrode as in Claim 5, where the electrolyte composition in the pH half-cell comprises 4 M KI, 0.0069 M KI₃, 0.2 M H₃BO₃, adjusted to pH 7.05 with KOH.

7. An electrode as in Claim 1, where the electrolyte in the reference half-cell comprises phosphate or borate buffer and a mixture of iodide and triiodide to stabilize the oxidation-reduction potential.

8. An electrode as in Claim 7, where the electrolyte composition in the reference half-cell comprises 4 M KI, 0.0069 M KI₃, 0.2 M H₃BO₃, adjusted to pH 7.05 with KOH.

9. An electrode as in Claim 1, where the porous, inert material comprises porous ceramic.

10. An electrode as in Claim 1, where the opening to the reference electrolyte compartment is covered with an elastomeric septum closure that is perforated to permit insertion of a tube which by reason of its small inside diameter compared to its length serves to reduce the rate at which moisture can diffuse into or out of the electrolyte compartment yet serves to permit sufficient ingress of air to allow electrolyte flow from the compartment through the liquid junction under the influence of gravity.

11. An electrode as in Claim 10, where the tube in the septum has an inner diameter of about 0.5 mm and a length of about 10 mm.

12. An electrode as in Claim 1, where the opening to the reference electrolyte compartment is covered with an elastomeric septum closure with a slit, said slit by reason of the substantial but not absolute barrier it provides between the compartment and outside environment serving to retard diffusion of moisture into or out of the electrolyte compartment yet serving to permit sufficient ingress of air to allow electrolyte flow from the compartment through the liquid junction under the influence of gravity and at the same time serving to allow convenient replenishment of electrolyte by any liquid delivery means with delivery tip shaped so as to be able to pry open the slit, said slit then

closing upon removal of delivery tip by reason of the restorative tendency of the elastomeric closure material.

13. An electrode as in Claim 12, where the material of the septum closure may be, but is not limited to, silicone elastomer with a durometer of from about 30 to about 45.

14. An electrode as in Claim 1, where the storage sleeve seal between the sleeve and electrode may be effected in a manner not limited to the following: the sleeve is composed of an elastomeric material having a durometer between 75 and 80, and forms a seal with the electrode cap upon insertion of the electrode into the sleeve.

15. An electrode as in Claim 1, where the absorbent material in the storage sleeve comprises glass wool.